New Invisible Perils that Menace Our Pr

Unexpec

Be Resp an

By Prof. Rudolf H
Of the University of

A GREAT series of fat the sea and in the al of the necessity of a mission to regulate the use phy and to inquire into vari mysterious phenomena conn

Where wireless telegraphy life its installation should but if it creates unknown d it does, the public should them.

The possible dangers from fall into three principal clas

1. Magnetization of steel a they exercise a powerful a another and upon other steel

2. Fires and explosions ca duced by the wireless.

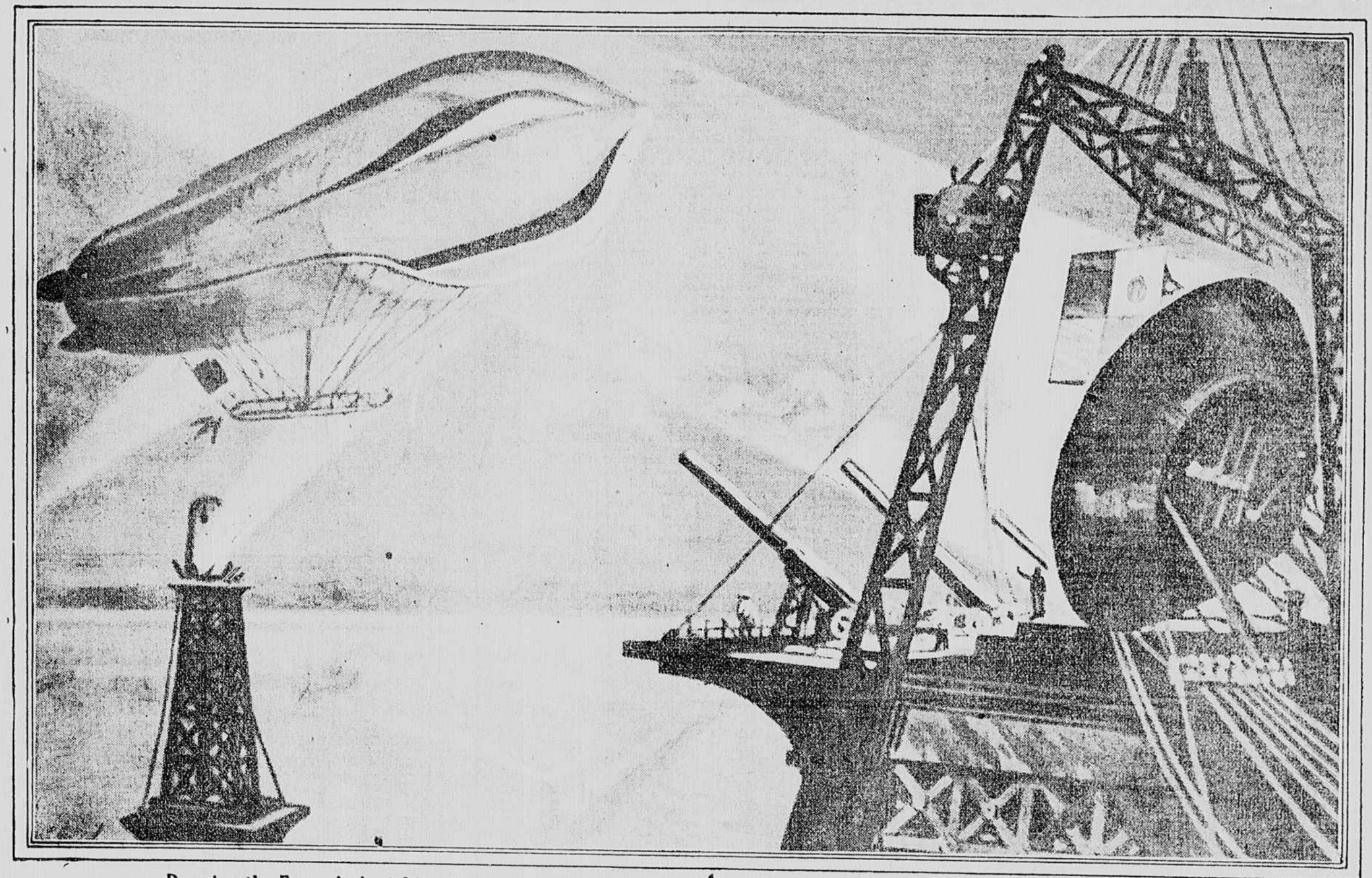
3. Derangement of ships' wireless.

In support of my content terious influence is at wor from their courses and pr call attention to a number of Never since the development were there as many acci past year. Now we know navigation has been perfecte and there should be fewer before. It seems clear th factor has entered into the s

Why did the Empress swerving several miles fro into disastrous collision wit both were going slowly, or n the Pretoria wander twen course, bringing her into co York, also said to have bee June 13?

Why did the North German navigating waters thoroughly ashore in the English Chann did the British steamship In man liner Kaiser Wilhelm waters on June 17?

Why did the Red Star ashore on the Crim Rocks



Drawing the Enemy's Aerial Battleships to Destruction by Means of the Magnetic Ray—A Possibility of Future War.

In This Picture by A. Lanos, the Famous French Imaginative Artist, the Enormous Transmitters of the Magnetic Rays in the Wireless Are Seen in Action. A Scouting Dirigible Has Been Drawn Irresistibly Through Miles of Air by Their Power, and Is Now Menaced by the Guns.

How Sun's Spots and the Moon's Pull Produce Airy Tides, Whirlpools, Gulfs and "Pockets" That Balk Man's Efforts to Make Himself a Flying A

By a Member of the Royal Astronomical Society of England.

AVIATORS in this country and England have been greatly impressed by a new theory that some of the most disastrous and inexplicable recent accidents which have befallen men of their calling were due to unrecognized "gravitational pulls" in the atmosphere.

It has been suggested, for instance, that the chief of these unknown factors is the supplementary gravitational action which the planets exercise in certain circumstances, not only upon the incandescent mass below the earth's crust, thus causing earthquakes and volcanic eruptions, and upon the oceans, so giving rise to marine disasters, but also on the aerial ocean.

Diagram Illustrating the Action of the "Holes in the Air" so Dreaded by Aviators and Now Believed by Science to Be Caused by Sun and Moon. Arrows Show Ascending Air Currents and Thin Descending Currents.

The theory is that all bodies exercise their tide-producing gravitational action on the fluids of our planet in direct proportion to their masses and in inverse proportion to the cube of their distances. It is said that the bodies which exercise this activity to any degree worthy of note are: First, the moon; second, the sun, and then, of very much less importance, but still to be taken into account, the following planets in order of intensity: Venus, Jupiter, Mars, Mercury and Saturn.

This theory has been worked out in great detail to show that the vast majority of aerial accidents have occurred when the planets named have been in conjunction with the earth.

The list of casualties has been carefully analyzed, and the conclusion has been reached that planetary influence may not be ignored.

While rashness and lack of skill upon the part of the aviator, on the one hand, and defective machinery on the other, must, of course, be taken into consideration in copsidering the causes of aerial disasters, there is not the slightest reason, it is pointed out, why these factors are more likely to be present on days when the planets are in adverse conjunction than on others. In other words, it is permissible to disregard these factors altogether in considering the extent of the influence of the planets. Considered from this aspect, the conclusion is reached that aviators will have to pay due regard to the position of the planets in the choice of days for flight.

In support of this theory it is pointed out that in 1913 there were only 174 "black" days—days on which the planets were in adverse conjunction to the earth—as against 191 white days—days on which the planets were favorably placed —and yet the total number of catastrophes due to atmospheric conditions were only 67 on "white" days, as against 136 on "black" days.

The results of 1912 are shown to be even more significant: 159 "black" days with 139 disasters, against 207 "white" days with only twenty-one catastrophes. The figures of 1911 are said to be equally impressive.

In 1913 there were only thirty-four aerial disasters on the 191 white days, while the smaller number of black days, 174, showed the largely increased figure of sixty, the last victim in that year being a British aviator Captain Lushington, who was the flight commander of the naval wing of the Royal Flying Corps and used to be the airman of the First Lord of the Admiralty, was killed at Eastchurch on December 2, a "black" day, since there was a conjunction Jupiter-moon the previous day.

In 1912 there were forty-five aerial tragedies on the 159 "black" days, while only fourteen occurred on the 207 "white" days of the year.

During the first two months of the present year there were twelve aerial disasters on black days, as against two only on white days.

This theory is very interesting but it is believed to be founded on fallacious reasoning. The real cause of adverse aerial conditions, it is now believed, must be laid to the influence of the sun and moon, particularly the sun. The influence of the planets named must be so inintesimal as to be negligible.

Just how little influence the distant planets can have in producing tides or other disturbances of the ocean, land or air, can be readily seen by referring to the accompanying table of sizes and distances, keeping in mind the formula that their influence is in direct proportion to their masses, but in inverse proportion to their distances.

(These figures are approximate only.)

Planet.	Mass Compared with that of Moon.	Nearest Distance from Earth Compared with that of Moon.	Tidal Influence Compared with that of Moon.
Mercury	2.6	240	.000,000,188
Venus	65.	108	.000,051,600
(Moon)	1	1	1.000,000,000
Mars	8.5	204	.000,001,062
Jupiter	25,000	1,600	.000,006,098
Saturn	7,600	3,400	.000,000,193
Uranus	1,170	7,100	.000,000,003
Neptune	1,360	11,340	.000,000,001

(The sun has an effect comparable with that of the moon, for although it is further distant than Mercury, Venus or Mars, it is nearly a hundred million times bigger than the moon.)

In the first column of figures is given the "mass" of each of the planets as compared with the mass of the moon. (The word "mass" being the scientific term corresponding with "weight," because "weight" is only a relative term, and applies specially to objects weighed upon the earth's surface.)

In the second column is the approximate distance of each planet when nearest the earth as compared with the distance of the moon.

In the third and last column the figures are the result of dividing the mass in each case by the cube of the distance to find the relative tidal influence as compared with that of the moon.

It will be noted that the greatest is that of Venus, which is only about one-twenty-thousandth as strong as that of the moon, while Mars has only about one-millionth as much effect on the earth as the moon has, and Neptune less than one-billionth.

In fact, if all the planets were in "conjunction" at the same time (which means all in a straight line with the sun and earth), their combined "influence" on the tides of the earth—whether ocean, land or air—would be about seventeen thousand times less than that of the moon—so slight that it is doubtful if the most delicate registering instruments could record it, even in the ocean tides.

When, therefore, we consider the land and air tides, which, if caused at all by the sun and moon, are exceedingly slight, we can readily see that one-seventeen-thousandth part of something that is barely noticeable would scarcely be enough to cause shipwrecks and aeroplane accidents.

There is, however, another way in which the sun in particular may have a very considerable effect on the air and the weather, and may be the direct cause of aerial disasters.

It has long been known that the Aurora Borealis, or "Northern Lights," is in some way caused by so-called storms on the sun, and it has also been observed frequently that the sending of telegraphic messages has been interfered with during an electrical storm (of which the Aurora is only a sign or symptom).

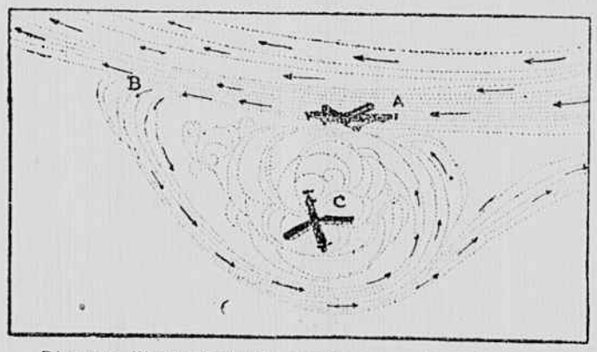


Diagram Illustrating the Action on an Aeroplane of the Invisible and Destructive Air Pocket, Now Believed to Be the Result of Sun Spots.

It is also known that the sun is a great centre of electrical energy, and is continually sending out tremendous impulses in addition to its light and heat.

It is some of these impulses or radiations that cause electrical changes on the earth and other planets and give rise to many phenomena which we do not entirely understand.

Whether the air pockets and treacherous air currents which have caused so many mishaps to aviators have some relation to such electrical impulses from the sun is a question that deserves much more consideration than whether the comparatively insignificant and inactive planets could be the direct cause of accidents by any tidal or gravitational action.

In the case of tidal effects the sun and moon are the only bodies at present near enough and large enough to exert any appreciable effect, for not only is the sun the only body in the solar system that is generating such radiant energy in any appreciable quantity, but it is a thousand times larger than all of the planets put together. The moon particularly is a cold, dead world, and is wholly different from the vastly larger and tremendously hot and active sun.

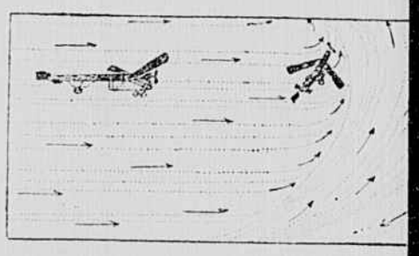
Then, too, both the sun and moon are responsible for various tides, although the ocean tides are the only ones usually attributed to solar or lunar influences.

The ocean tides, of course, are caused directly by the varying attraction of the sun and moon, and it is now pretty generally accepted that the solid earth itself is subject to tides from the same cause. In other words, when the sun and moon are both "pulling" in the same or opposite directions, the earth becomes slightly oval or bulging in the direction of the pull. These "land tides" are, of course, very slight, and are important chiefly on account of the strains or "stresses" caused in rock strata and along geologic "faults," any disturbance of which is sure to cause an earthquake.

Similarly, a volcanic eruption could easily be started by a strain which would upset the conditions which keep the volcano inactive. Sometimes, in fact, normal conditions under the surface of the earth depend upon very delicate balances indeed, such as a huge mass of rock weighing millions of tons, which is supported over a vast subterranean chasm by the mere edge of a precipice—like a dreadnaught's gun on a hair-trigger—so that it will take only a very slight movement to dislodge it.

Then comes a time when the sun and moon are nearer the earth than usual, and on opposite sides of it—at a full moon or in "opposition"—which causes the crust of the earth to bulge ever so slightly, and the mass of rock drops into the chasm (it may be only a few feet or inches), and then, when the surrounding rocks are settling or adjusting themselves to stable pos or tremors are felt all over a

There is a third kind of t little is known, and these are mospheric or "air tides." Th to be similar to the ocean t the extreme fluidity of the at absence of obstructions (suc islands and shallow waters tides) it is now thought that tides not only affect the b pressure but are the direct holes" or "pockets" which pr to aviators.



The "Geyser," Another Air Terror No Avi

That the atmosphere is ver structure is being realized mor serious work has been attempt and aviation.

Formerly it was supposed and temperature measurement by aeronauts at different heig balloons which gradually ascen making records as they went, served sudden differences of te ure, etc., were due to inaccura ments or carelessness of the ob

It has been discovered rece not the case, and that these s actually occur.

In a series of writings by Director of the British Meteor "Principia Atmospherica," he ly that so-called air-pockets an of pressure forming the much- the air," are characteristics o in its ordinary, every-day co ever little is known about t that they are governed by laws to science and that the planet larly concerned in their forma are now being investigated.

Just how aviators will be abl selves against the air-currents is more fully understood must consideration, but it is not un pose that a way will be found t

The principal thing for avi is to ascertain the causes of a When that has been accompl be so very difficult, with the gating devices, to chart and av